Chapter 8 - Structures, Bridges, and Retaining Walls

8.1 General

8.1.1 Structures

The City of Castle Pines has developed requirements for the design and construction of certain structures within the City. They include bridges, large culverts and other major drainage structures, retaining walls, and guardrails.

8.1.2 Guardrails

The design, location, and necessity of guardrails for bridge and roadside obstruction situations, as well as design of the same, shall be in accordance with the latest edition of the AASHTO Roadside Design Guide.

8.1.3 Pedestrian/Bicycle Railings

Railings shall be required at, and continuously along, sidewalks or multimodal paths where there are vertical separations of 30 inches or greater, or on slopes greater than or equal to 3:1 adjacent to these walks and paths. For low-water crossings, Mile High Flood District (MHFD) design guidelines may apply.

8.1.4 Retaining Walls

Retaining walls shall be required whenever slopes exceed 3 feet of run to 1 foot in rise (3:1). Refer to Section 1807.2 of the International Building Code for additional design criteria. Slopes to be revegetated and to be maintained by the landowner shall not exceed 4 feet of run to 1 foot of rise (4:1).

1) Retaining Wall Heights
    a) Detention, retention, and water quality ponds shall not have retaining walls exceeding 48 inches, unless the City determines there is an issue of aesthetics, in which case the maximum wall height will not exceed 72 inches. Railings may be required along the top of these walls. This requirement will be determined at the time of civil plan submittal.
    b) Residential Development
        i) Maximum 48 inches in height adjacent to rear lot lines
        ii) Maximum 30 inches in height adjacent to side lot lines
        iii) Maximum 30 inches in height in front yards and side yards for corner lots
        iv) Maximum 48 inches in height in all common areas
        v) Terraced retaining walls are not permitted within the side yards of single-family detached homes
2) Other Retaining Wall Heights
    a) All other retaining wall heights shall not exceed 8 feet. Walls shall be terraced until the required amount of slope has been taken up. Slopes between walls shall not exceed 4 feet of run to 1 foot of rise (4:1).
3) Railings
    a) Railings may be required along the top of walls. This requirement will be determined at the time of civil plan submittal. The design of retaining walls, wing walls, and miscellaneous structures that

are unattached and not considered part of a building shall be submitted with the Civil Construction Plans to the City. The design for walls attached to and part of a building, or for walls that a building is structurally dependent on, shall be submitted to the City for review.

4) Details
    a) Details are required on all retaining walls at bridges and structures and shall be included on the drainage or grading drawings.
5) Retaining walls, miscellaneous structures, wing walls higher than 4 feet from grade or adjacent to easements, public rights-of-way, or fire lanes that intrude on a line projected at 3:1 (H:V) slope from the easement line, right-of-way line, or edge of a fire lane shall be designed, signed, sealed, and dated by a Professional Engineer (PE) licensed in the State of Colorado before review by the City.
6) Concrete poured-in-place retaining walls shall be designed and submitted along with the first submittal of the civil construction drawings for the development. The structural calculations shall be included in the first civil construction drawing submittal.
7) Terraced retaining walls with a total vertical height greater than 4 feet shall be designed, signed, sealed, and dated by a PE licensed in the State of Colorado before City review. If the horizontal distance between the terraced walls is less than twice the height of the lower wall (even if the individual walls are less than 4 feet high), the following criteria apply:
    a) The entire terraced wall height shall be considered to act as one wall and shall be designed as one wall.
    b) Each terrace of the wall can be designed individually, as long as such design is accompanied by a Global Stability Analysis performed on the entire terraced wall height. Retaining walls used to support a roadway, driveway, or structure shall be designed, and the plans sealed, signed, and dated by a PE licensed in the State of Colorado. Guardrails, pedestrian railings, or both, shall be included with the design. Mechanically stabilized earth walls shall not have any tie-backs within the public right-of-way, unless approved in advance by the City.
8) Retaining walls along sidewalks, trails, wing walls, and head walls exceeding 30 inches in height require railings. Retaining walls along bicycle trails require bicycle railings. Bicycle railings must be designed in accordance with the latest edition of American Association of State Highway and Transportation Officials' (AASHTO) *Guide for the Development of Bicycle Facilities*.
9) A retaining wall Permit shall be obtained from the City prior to constructing any retaining walls.
10) When retaining walls are not cast-in-place retaining walls, the walls are greater than 4 feet in height, or there are terraced retaining walls where the horizontal distance between the walls is less than twice the height of the lower wall (even if the individual walls are less than 4 feet in height), then the contractor must submit structural calculations (and details as needed on 24-inch-by-36-inch drawings) to the City for review and approval prior to pulling a Permit to construct those walls.
11) Private retaining walls within and along public rights-of-way or easements require a license agreement.

8.1.5 Bridges

Bridge structures shall be designed and constructed in accordance with the latest Colorado Department of Transportation (CDOT) Standards and Specifications.

8.1.6 Drainage Structures and Culverts

Drainage structures shall be designed in accordance with the latest CDOT Standards and Specifications, as well as MHFD.